```
  % % % % % % % % % % % % % % % % % % % % % % % %
 % % % % % % % % % % % % % % % % % % % % % % % % %
% %                                             % %
 %                AT$T 5ESS(tm)                  %
% %           From Top to Bottom                % %
 %                                               %
% %                                             % %
 %            by: Firm G.R.A.S.P.                %
% %                                             % %
 % % % % % % % % % % % % % % % % % % % % % % % % %
  % % % % % % % % % % % % % % % % % % % % % % % %
```

Introduction
~~~~~~~~~~~~

   Welcome to the world of the 5ESS. In this file I will be covering the switch topology, hardware, software, and how to program the switch. I am sure this file will make a few people pissed off over at BellCORE.

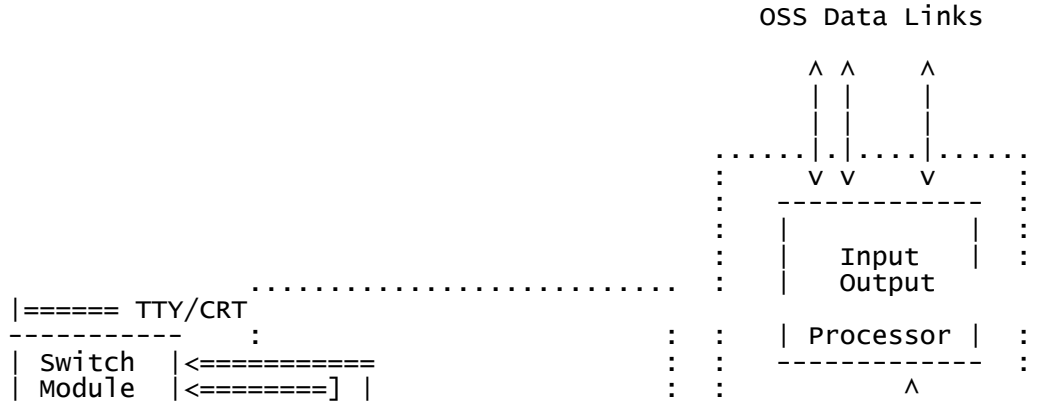
   Anyways, the 5ESS switch is the best (I think) all around switch. Far better then an NT. NT has spent too much time with SONET and their S/DMS TransportNode OC48. Not enough time with ISDN, like AT$T has done. Not only that, but DMS 100s are slow, slow, slow! Though I must hand it to NT, their DMS-1 is far better then AT&T's SLC-96.

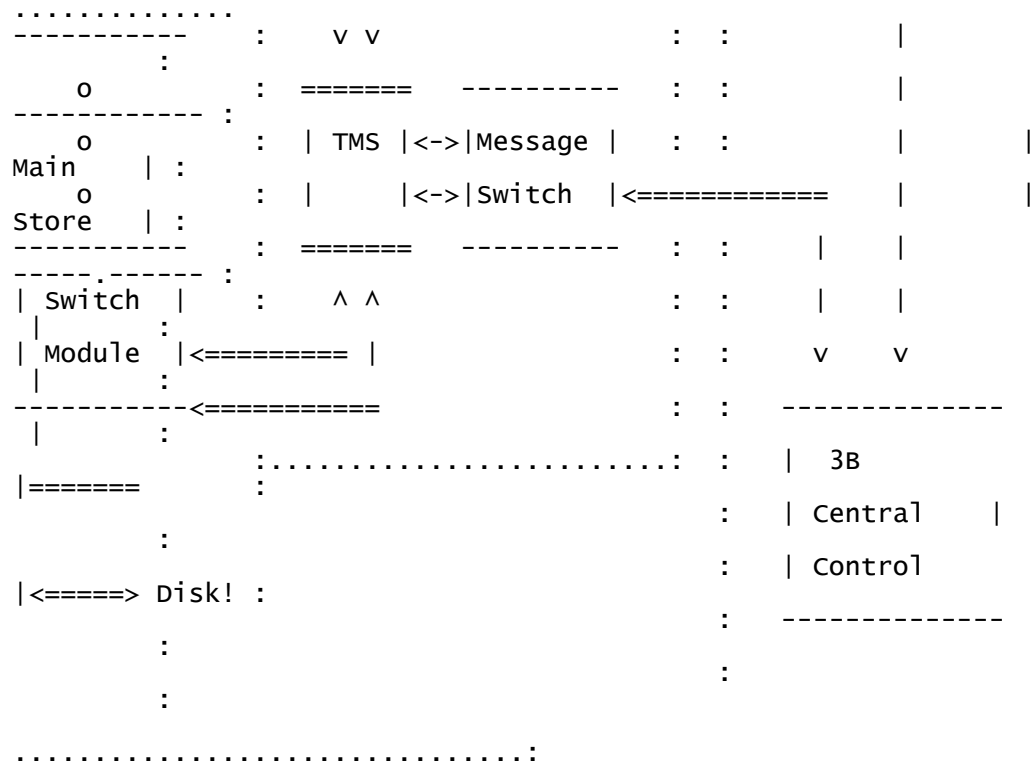
What is the 5ESS
~~~~~~~~~~~~~~~~

   The 5ESS is a switch. The first No. 5ESS in service was cut over in Seneca, Illinois (815) in the early 1982. This test ran into a few problem, but all and all was a success. The 5ESS is a digital switching system, this adcantage was realized in No. 4 ESS in 1976. The 5ESS network is a TST (Time Space Time) topology, the TSIs (Time Slot Interchangers) each have their own processor, this makes the 5ESS one of the faster switches. Though I hear some ATM switchs are getting up there.

5ESS System Architecture & Hardware
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                    5ESS SYSTEM ARCHITECTURE


~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~



COMMUNICATIONS MODULE ADMINSTRATIVE MODUAL

The 5 ESS is a digital SPC switching system which utilizes distributed control, a TST switching network and modular hardware and software design.

The major components are:

ADMINSTRATIVE MODUAL

Two 3B2OS Processors (Which equal a 3B2OD)

- Central control and main storage
- Disk storage for infrequently used programs and data, and main storage regeneration.
- The two 3B2OS processors are always compairing data, and when one fails the other acts in its place.

Two Input/Output Processors (IOP)

- Provides TTY and data-link interfaces to the 3B2OD Processor, 5ESS Network, Master Control Center (MCC), and various Operational Support Systems (OSS). Here is a list of the defult TTY (also called "channels")

tty	Channel Name
ttyA	Master control console (MCC) terminal.
ttyB	Master control console (MCC) terminal.
ttyC	Traffic report printer
ttyJ	supplementary trunk and line work station (STLWS) terminals
ttyK	supplementary trunk and line work station

```
(STLWS) terminals
         ttyL     supplementary trunk and line work station
(STLWS) terminals
         ttyM     supplementary trunk and line work station
(STLWS) terminals
         ttyN     supplementary trunk and line work station
(STLWS) terminals
         ttyO     supplementary trunk and line work station
(STLWS) terminals
         ttyP     Repair service bureau - Recent change and
verify (RSB-RCV)
         ttyR     Office records printer
         ttyQ     Switching control center-recent change and
verify (SCC-RCV)
                   terminals
         ttyR     Repair service bureau-automatic line insulation
testing
                   (RSB-ALIT) terminal.
         ttyS     Switching control center-recent change and
verify (SCC-RCV)
                   terminals
         ttyT     Switching control center-recent change and
verify (SCC-RCV)
                   terminals
         ttyU     Belt line B
         ttyV     Local recent change and verify (RCV) terminal
         ttyW     Remote recent change and verify (RCV) terminal.
         ttyY     Network administration center (NAC) terminal.
         ttyZ     The switching control center (SCC) terminal.
         ttyi     SLC(R) carrier maintenance
         ttyj     STLWS - fifth of six
         ttyk     STLWS - sixth of six
         ttyl     STLWS - first of six
         ttym     STLWS - second of six
         ttyn     STLWS - third of six
         ttyo     STLWS - fourth of six
         ttyp     RCV/Repair Service Bureau
         ttyq     RCV/Network Administration Center
         ttyr     ALIT/Repair Service Bureau
         ttys     Maintenance
         ttyt     Maintenance
         ttyu     Belt line A
         ttyv     Local RC/V
         ttyw     Remote RC/V
         ttyx     Maintenance Control Center/Switching Control
Center System
                   (MCC/SCCS)
         ttyy     Maintenance Control Center/Switching Control
Center System
                   (MCC/SCCS)
         ttyz     Maintenance Control Center/Switching Control
Center System
                   (MCC/SCCS)

         FILE     Destination file name in /rclog partition

         mt00     High-density tape device, rewind after I/O
         mt04     High-density tape device, does not rewind after
I/O
         mt08     Low-density tape device, rewind after I/O
         mt0c     Low-density tape device, does not rewind after
I/O
         mt18     Low-density tape device, rewind after I/O
         mt1c     Low-density tape device, does not rewind after
I/O
         mttypc0  Special tape device, IOP 0, rewind after I/O
         mttypc1  Special tape device, IOP 1, rewind after I/O.

     Two Automatic Message Accounting (AMA) units
```

- Uses data links to transport calling information to central revenue accounting office and AMA tape. Here is the basic structure AMA structure for the OSPS model.

  - Called customer's telephone number, either a seven- or ten-digit number
  - Calling customer's telephone number, seven digits
  - Date
  - Time of day
  - Duration of conversation.

COMMUNICATIONS MODULE

Message Switch (MSGS)

- Provides for control message transfer between the 3B2OD Processor and Interface Modules (IM's)
- Contains the clock for synchronizing the network.

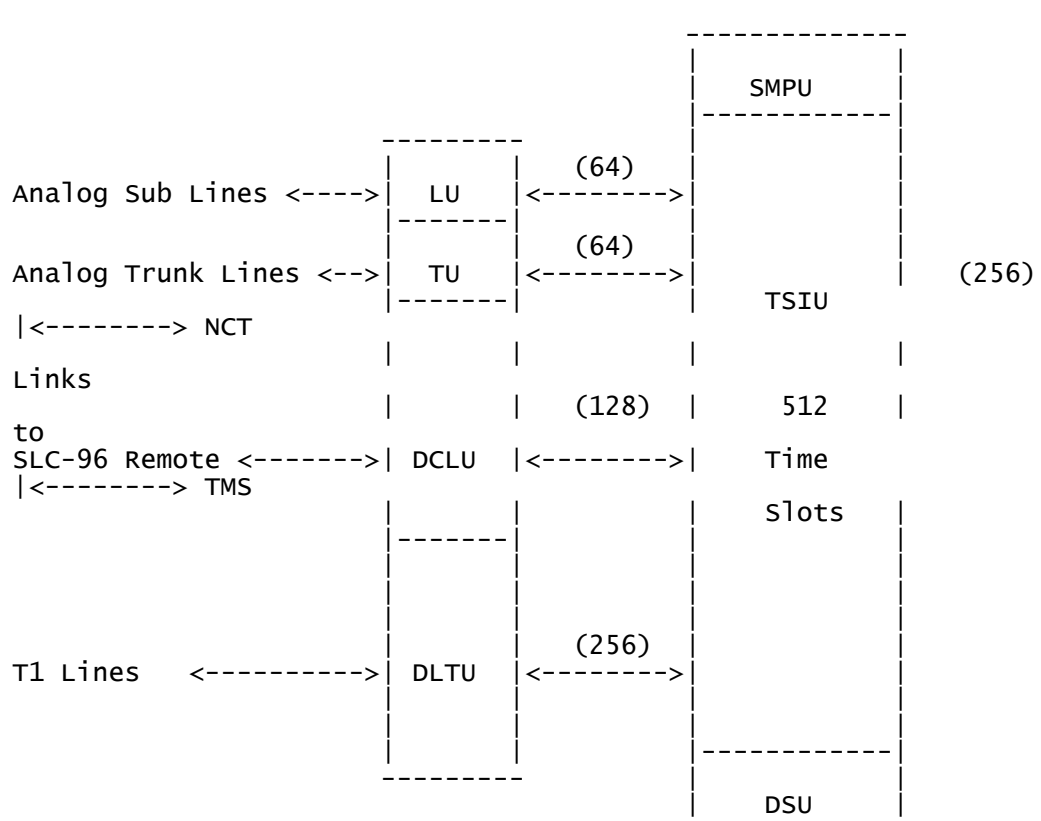
Time Mutiplexed Switch (TMS)

- Performs space division switching between SM's
- Provides permanent time slot paths between each SM and the MSGS for control messages between the Processor and SM's (or between SM's)

Switching Modual (SM)

- Terminates line and trunks
- Performs time division switching
- Contains a microprocessor which performs call processing function for the SM

5ESS - SWITCH MODUAL



COMMON COMPONENTS OF THE SWITCH MODULE (SM)

Switch Module Processor Unit (SMPU)

- Contains microprocessors which perform many of the call processing functions for trunks and links terminated on the SM.

Time Slot Interchange Unit (TSIU)

- 512 time slot capacity
- Connects to the TMS over two 256-time slot Network Control and Timing (NCT) links.
- Switches time slots from Interface Units to one of the NCT links (for intermodule calls).
- Switches time slots from one Interface Unit to another within the SM (for intramodule calls).

Digital Service Unit (DSU)

- Local DSU provides high usage service circuits, such as tone decoders and generators, for lines and trunks terminated on the SM.
- Global DSU provides low useage service circuits, such as 3-port confrence circuits and the Transmission Test Facility, for all lines and trunks in the office (requires 64 time slots).

The SM may be equipped with four types of Interface Units:

Line Unit (LU)

- For terminating analog lines.
- Contains a solid-state two-stage analog concentrator that provides access to 64 output channels. The concentrator can be fully equipped to provide 8:1 concentration or can be fully equipped to provide 6:1 or 4:1 concentration.
- Each TU requires 64 time slots.

Trunk Unit (TU)

- For terminating analog trunks.
- Each TU requires 64 time slots.

Digital Line Trunk Unit (DLTU)

- For terminating digital trunks and RSM's.
- Each fully equipped DLTU requires 256 time slots.
- A maximum of 10 DSls maybe terminated on one DLTU.

The SM may be equipped with any combination of LU's, TU's, DCLU's and DLTU's totaling 512 time slots.

5ESS System Software
~~~~~~~~~~~~~~~~~~~

The 5ESS is a UNIX based switch. UNIX has played a large part in switching systems since 1973 when UNIX was use in the Switching Control Center
~~~~~~~~~~~~~~~~~~~

System (SCCS). The first SCCS was a 16 bit microcomputer. The use of
UNIX for SCCS allowed development in C code, pseudo code, load test,
structure and thought. This led the development of the other switching systems
which AT$T produces today (such at System 75, 85, 1AESS AP, and 5ESS).
NOTE: You may hear SCCS called the "mini" sometimes
   The 5ESS's /etc/getty is not set up for the normal login that one would
expect to see on a UNIX System. This is due to the different channels that
the 5ESS has. The some channels are the TEST Channel, Maintance Channel,
and RC Channel (which will be the point of focus). Once you are on one
channel you can not change the channel, as someone has said " it is
not a TV!" You are physically on the channel you are on.

Test Channel
~~~~~~~~~~~

   The TEST channel is where one can test lines, and test the switch itself.
This is where operating support systems (such as LMOS) operate from.
This channel allows one to monitor lines via the number test trunk aka
adding a third trunk), voltage test and line seizure.
Here is a list of OSSs which access the test channels on the 5ESS.

Group	Operating Support Systems
Specal Service Center	
	SMAS via NO-Test
	SARTS (IPS)
	NO-TEST trunk (from the switch)
	TIRKS
	17B and 17E test boards (CCSA net using X-Bar)
	RTS
	BLV
	POVT
	DTAC
	etc...
Repair Service Bureau	
	#16LTD
	#14LTD
	LMOS (IPS)
	MLT-2
	ADTS
	TIRKS
	TFTP
	TRCO
	DAMT
	ATICS
	etc...

SCC Channel
~~~~~~~~~~

   The SCC channel is where the SCC looks and watches the switch 24 hours a day,
seven days a week! From this channel one can input RC messages if nessary.
A lot of people have scanned these out, and though they were

AMATs. Well this
is in short, WRONG! Here is a sample buffering of what they are
finding.

```
------------------------------------------------------------------
------------

   S570-67 92-12-21 16:16:48 086901 MDIIMON BOZOVILL DS0
A  REPT MDII WSN  SIGTYPE DP            TKGMN 779-16    SZ 21
OOS 0
     SUPRVSN RB  TIME 22:16:48  TEN=14-0-1-3-1  TRIAL 1 CARRFLAG
NC     ID
     OGT  NORMAL  CALL  CALLED-NO       CALLING-NO      DISCARD 0

   S4C0-148963487 92-12-21 16:17:03 086902 MAIPR BOZOVILL DS0
   OP:CFGSTAT,SM=1&&192,OOS,NOPRINT; PF

   S570-67 92-12-21 16:17:13 086903 S0 BOZOVILL DS0
M  OP CFGSTAT SM 5 FIRST RECORD
     UNIT                       MTCE STATE       ACTIVITY  HDWCHK
DGN RESULT
     LUCHAN=5-0-0-3-4           OOS,AUTO,FE      BUSY      INH
   CATP
     LUCHAN=5-0-0-2-5           OOS,AUTO,FE      BUSY      INH
   ATP
     LUCHAN=5-0-0-0-3           OOS,AUTO,FE      BUSY      INH
   ATP
     LUCHAN=5-0-0-3-5           OOS,AUTO,FE      BUSY      INH
   ATP
     LUHLSC=5-0-0-1             OOS,AUTO,FE      BUSY      INH
   ATP
     LUCHAN=5-0-0-0-2           OOS,AUTO,FE      BUSY      INH
   CATP
     LUCHAN=5-0-0-3-6           OOS,AUTO,FE      BUSY      INH
   ATP
     LUCHAN=5-0-0-1-4           OOS,AUTO,FE      BUSY      INH
   ATP

   S570-983110 92-12-21 17:09:53 144471 TRCE WCDS0
A  TRC IPCT EVENT 2991
     DN 6102330000  DIALED    DN 6102220001
     TIME 17:09:52

------------------------------------------------------------------
-------------
```

  This has nothing to do with AMA, this is switch output on say
the SCC
channel. This is used by the SCCS for logging, and monotering of
alarms.
The whole point of this channel is to make sure the switch is
doing what it
should do, and to log all activity onthe switch. NOTHING MORE!
   To go into these messages and say what they are would take far
too long,
order the OM manuals for the 5ESS, watch out, they are about 5
times the size of
the IM (input manual) set. On average it takes someone three
years of training
to be able to understand all this stuff, there is no way anyone
can write a
little file in Phrack and hope all who read it understand
everything about the
5ESS. RTFM!

RC Channel
~~~~~~~~~

   The RC/V (Recent Change/Verify) Channel is where new features
can be added or taken
~~~~~~~~~

away from phone lines. This is the main channel you may come in contact with,
if you come in contact with any at all. When one connects to a 5ESS RC/V channel
one may be dumped to a CRAFT
shell if the login has not been activated. Access to the switch when the
login is active is controlled by lognames and passwords to restrict
unwanted entry to the system. In addition, the SCC (Switching Control
Center) sets permission modes in the 5ESS switch which control the RC
(recent change) security function.
   The RC security function determines whether recent changes may be made
and what types of changes are allowed. If a situation arises where the RC
security function denies the user access to recent change via RMAS or RC
channels, the SCC must be contacted so that the permission modes can be
modified. (Hint Hint)
   The RC security function enables the operating telephone company
to decide which of its terminals are to be allowed access to which
set of RC abilities. NOTE that all verify input messages are always
allowed and cannot be restricted, which does not help too much.
     The RC security data is not part of the ODD (office dependent data).
Instead, the RC security data is stored in relatively safe DMERT operating
system files which are only modifiable using the following message:

```
SET:RCACCESS,TTY="aaaaa",ACCESS=H'bbbbb;

where: aaaaa = Symbolic name of terminal in double quotes
          H' = Hexadecimal number indicator in MML
       bbbbb = 5-character hexadecimal field in 5E4 constructed
               from binary bits corresponding to RC ability.
               The field range in hexadecimal is from 00000 to
               FFFFF.

     This message must be entered for each type terminal (i.e.
               "aaaaa"="rmas1", "rmas2", etc., as noted above in
                TTY explanations).
```

NOTE: Order IM-5D000-01 (5ESS input manual) or OM-5D000-01 (5ESS output manual)
for more information on this and other messages from the CIC at 1-800-432-6600.
You have the money, they have the manuals, do not ask, just order. I
think they take AMEX!

     When the message is typed in, a DMERT operating system file is created
for a particular terminal. The content of these files, one for each terminal,
is a binary field with each bit position representing a unique set of RC
abilities. Conversion of this hexadecimal field to binary is accomplished
by converting each hexadecimal character to its equivalent 4-bit binary string.

HEX	BINARY	HEX	BINARY	HEX	BINARY	HEX	BINARY
0	0000	4	0100	8	1000	C	1100
1	0001	5	0101	9	1001	D	1101
2	0010	6	0110	A	1010	E	1110
3	0011	7	0111	B	1011	F	1111

Each bit position corresponds to a recent change functional area.
A hexadecimal value of FFFFF indicates that all bit positions are set to 1 indicating that a particular terminal has total RC access. Also, verify operations as well as lettered classes are not included in the terminals security scheme since all terminals have access to verify views and lettered classes.

In addition, maintenance personnel are able to verify the security code for any terminal by typing the following message from either the MCC (Master Control Center) or SCCS (Switching Control Center System)
Mini terminal:

```
OP:RCACCESS,TTY="xxxxx";
```

where: xxxxx = symbolic name of terminal in double quotes.

Each bit position corresponds to a recent change functional area.

To ensure redundancy, DMERT operating system files are backed up immediately on disk by the SCC.

The input message that defines the password and CLERK-ID (another name for username) is in the Global RC feature. This input message defines a clerk-id and associated password or deletes an existing one. (Recall that CLERK-ID and PASSWORD are required fields on the Global RC Schedule view 28.1 in RCV:MENU:APPRC, but more on this later)

This new input message is as follows:

```
GRC:PASSWORD,CLERKID=xxxxxxxxxx,[PASSWD=xxxxxxxx|DELETE]
```

Note: CLERKID can be from 1 to 10 alphanumeric characters and PASSWORD from 1 to 8 alphanumeric characters.

This input message can only be executed from the MCC or SCCS terminals, and only one password is allowed per CLERK-ID. To change a clerk-id's password, this message is used with the same CLERK-ID but with a different password.

Global RC Schedule View 28.1 from the RC/V Recent Change Menu System

```
                          5ESS SWITCH  WCDS0
                          RECENT CHANGE  28.1
                   GLOBAL RECENT CHANGE SCHEDULING

*1. GRC NAME    __________
*2. SECTION     _____
```

```
#3. CLERK ID   __________
#4. PASSWORD   _________
 5. MODE       _______
 6. RDATE      ______
 7. RTIME      ____
 8. SPLIT      _
 9. SPLIT SIZE _____
10. MAX ERRORS _____
11. VERBOSE    _
```

When the security is set up on the RC/V channel, one will see:

5ESS login

```
15       WCDS0                    5E6(1)
ttsn-cdN TTYW

Account name:
```

There are no defults, since the CLERK-ID and the password are set by craft,
but common password would be the name of the town, CLLI, MANAGER, SYSTEM,
5ESS, SCCS1, SCC, RCMAC, RCMAxx, etc,...
If one sees just a " < " prompt you are at the 'craft' shell
of the RC/V channel, the 5E login has not been set. The Craft shell is
running on the DMERT (which is a UNIX environment delovment operating system,
a System V hack). The Craft shell prompt is a "<". From this shell one
will see several error messages. Here is a list and what they mean:

Error Message	Meaning
?A	Action field contains an error
?D	Data field contains an error
?E	Error exists in the message but can not be resolved to the proper field (this is the "you have no idea" message)
?I	Identification field contains an error
?T	Time-out has occured on channel
?W	Warning exists in input line

Other output message meanings, from the RC/V craft menu.

OK	Good
PF	Printout follows
RL	Retry later
NG	No good, typically hardware failure (ie: SM does not exist)
IP	In progress
NA	The message was not received by the backup control process

When inputing RC messages it is best to do it in the middle of the day

since RC messages are sent to each channel! The SCC is watching and if
there are RC messages running across at 3 in the morning, the SCC is going
to wonder what the hell RCMAC (Recent Change Memory Adminastration Center)
is doing at three in the morning! However, one may be hiden by MARCH's
soaking, and the night shift at the SCC are overloaded and may miss
what is going on while correcting other major problems. So it is up to
you.

DMERT
~~~~

    The DMERT (Duplex Multiple Environment Real Time) uses the Western
Electric (another name for AT$T!) 3B2OD Duplex processor (or 2 3B2OS
Simplex processors). The DMERT software totals nearly nine thousand
source files, one million lines of nonblank source code,
and was developed by approximately 2OO programers. There are eight main
releases of this software, they are referred to as generics (like 5E4.1,
5E4.2, to 5E8.1 also seen as 5E4(1), 5E4(2) to 5E8(1), this can be though
of as DOS verson). DMERT is similar to regular UNIX but can be best described
as a custom UNIX system based on the 3B2OD, the DMERT OS can be ported to
PDP-11/7Os or a large IBM Mainframe. The DMERT operating system is split both
logically and physically. Physically, the software is evenly divided across
the five (there were seven Software Delevolment systems all running a 3B2OS
where the DMERT code was writen) Software Delovment systems. Logical, the
software is divided into twenty-four different subsystems. To access this
from the "craft" shell of the RC/V channel, type:

RCV:MENU:SH!

NOTE:
This will dump one to a root shell, from which VaxBuster's (Who knows nothing
about VAXen, always wondered about him) file on how to redirect a TTY may
come in useful.

Programing the 5ESS
~~~~~~~~~~~~~~~~~~

When programing the 5ESS there are things one should know, the first is that
one has a lot of power (just keep 911 in mind, it would be foolish to even
think of disrupting anyones service. 911 is there for a reason, it should STAY
that way). And anything one does is logged, and can be watched from the
SCC. Note that the night SCC crew is a lot more lax on how things are done
then the day shift, so it would be best to do this at night. I could tell you

how to crash the switch in two seconds, but that is not the point here.
Destroying something is easy, anyone can do that, there is no point to it.
All that taking down a switch will do is get one into jail, and get sued if
someone needed 911 etc,... (I think SRI is wishing they had talked to me
now).

RC from Craft Shell on RC/V Channel
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

    RC and VFY is complex from the craft shell on the RC/V channel.
This is called the input text option. It is accessed by using the

RCV:APPTEXT:

    This gets a little complex to follow, but the best thing to do
is to order the Manual 235-118-215 Recent Change Procedures Text Interface
[5E4] it is $346.87, another good one to get is 235-118-242, for $413 even
and last, but the best is 235-118-243, this beast is only $1344.63 what a
deal. When calling the CIC they will transfer you to a rep. from your area.
Gets to be kind of a pain in the ass, but.. Anyways, back on track:

RCV:APPTEXT:DATA[,SUMMARY|,NSUMMARY][,VFYIMMED|,VFYEND][,VFYNMVAL|,VFYSCIMG]

[,DEVICE={STDOUT|ROP|ROP0|FILE|TTYx}],FORM=...,DATA,FORM=...,END;

DATA   - This is for more then one RC operation in the same command

FORM   - The format that is to be used

SUMMARY - Turns on one line summarys on the read only printer (ROP) (DEFULT)
NSUMMARY - Turns off one line summary logging by the ROP

VFYIMMED - Prints out verifys (VFYs) immedately, does not wait for
            session end.
VFYEND   - Prints out all VFYs at session end, this is the DEFULT.

VFYNMVAL - Print verify output in name-value pair format, this must be
            directed into a file (see DEVICE).
VFYSCIMG - Makes output into screen size image (DEFULT).

DEVICE   - Redirect verify output to a device other than ones screen.

            ROP/ROP0   - Send verify output to the ROP

            STDOUT   - Send verify output to ones screen (DEFULT)

            TTYx   - Send verify output to any valid tty (such as
                         ttya and ttyv) that exists in "/dev."
You
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

must use the tty name, not tty number.
FILE - Send verify output to a file in "/rclog". The
file will be prefixed with "RCTX", and the usert
will be given the name of the file at the
beginning and end of the APPTEXT session.
END - END of message.

If the parameter is not entered on the command line, it may be entered after the APPTEXT process begins, but must be entered prior to the first "FORM=" statement. Here is a example of a MML RCV:APPTEXT.

```
rcv:apptext:data,form=2v1&vfy,set="oe.entype"&lset="oe.len"&xxxxx
xxx,pty=i,vfy!
```

The 2V1 may look strange at first, it may help getting use to the basics first. To just VFY telephone numbers, just do a:

```
RCV:APPTEXT:DATA,FORM=1V6-VFY,TN=5551212,VFY,END!
```

Though I can not really explain this any more then I have just due to time and space. These input messages may look complex at first, but are really simple, and much better then dealing with the menu system, but you will need to learn RC yourself! No one can explain it to you.

Pulling AMA from the RC/V channel Craft Shell

Pulling AMA up is all in the mater on one command. The command is:

```
OP:AMA:SESSION[,ST1|,ST2];
```

This command will request a report of the current or most recent automatic message accounting (AMA) tape. ST1 and ST2 are the data streams.

Pulling up out of Service Lines, Trunks or Trunk Groups

One may want to pull up all the out of service lines, trunks, or trunk groups for many reasons. These reasons i will not go into, but from which lines can be set up. The command to do this from the craft shell is a PDS command, this command is with a 'ball bat' (a `` ! '').

```
OP:LIST,LINES[,FULL][,PRINT][;[a][,b][,c][,d][,e]]!

OP:LIST,TRUNKS[,FULL][,PRINT][;[a][,b][,c][,d][,e]]!

OP:LIST,TG [,FULL][,PRINT][;[a][,b][,c][,d][,e]]!
```

FULL - All (primary and pending) are printed. Note FULL is not the default when inputing this command.

PRINT - Print to the ROP in the CO. (Not a good idea)

a-e - This is port status to match against the subset of

trunks, lines
            or trunk groups that are specified. (This is
required input
            for FULL)

The 5ESS RC/V Menu Shell
~~~~~~~~~~~~~~~~~~~~~~~~

To access this shell from the RC/V channel craft shell, type:

RCV:MENU:APPRC

at the `` < '' prompt.

To access the 5ESS RC/V menu system from the MCC, STLWS, and TLWS
channel/terminals, one uses what are called pokes. The poke that
is used here to access the RC/V Menu system on the 5ESS is 196.

Type 196 at the `` CMD< '' prompt, and you are on the RC/V menu
system
of the 5ESS switch. This will cause ``RC/V 196 STARTING'' and
``RC/V 196 COMPLETED'' to be printed out on the ROP.

Either way, this will toss you into a menu system. The main menu
looks like
this:

```
------------------------------------------------------------------
-------------

                              5ESS SWITCH  WCDS0
                         RECENT CHANGE AND VERIFY CLASSES

H RCV HELP               9  DIGIT ANALYSIS          20 SM PACK &
SUBPACK
A ADMINISTRATION         10 ROUTING & CHARGING      21 OSPS
FEATURE DEFINITION
B BATCH INPUT PARMS      11 CUTOVER STATUS          22 ISDN --
EQUIPMENT
1 LINES                  12 BRCS FEATURE DEFINITION 23 ISDN
2 LINES -- OE            13 TRAFFIC MEASUREMENTS    24
APPLICATIONS PROCESSOR
3 LINES -- MLHG          14 LINE & TRUNK TEST       25 LARGE DATA
MOVEMENT
4 LINES -- MISC.         15 COMMON NTWK INTERFACE   26 OSPS TOLL &
ASSIST/ISP
5 TRUNKS17 CM MODULE                                27 OSPS TOLL &
ASSIST
7 TRUNKS - MISC.         18 SM & REMOTE TERMINALS   28 GLOBAL RC -
LINES
8 OFFICE MISC. & ALARMS 19 SM UNIT

Menu Commands:

------------------------------------------------------------------
-------------
```

  The help menus for the 5ESS switch are lame, but I though that
it would
be good to show them to you just for the hell of it, because it
does explain
a little about the switch.

```
------------------------------------------------------------------
-------------

                           SCREEN 1 OF 7  5ESS SWITCH
                             RECENT CHANGE VIEW H.1
                            COMMANDS FOR MENU PAGES
```
~~~~~~~~~~~~~~~~~~~~~~~~

```
    H  - Explains commands for MENU or views. If you enter H
again, then it
         will display next HELP page.
    H# - Select HELP page. (# - help page number)
    Q  - Quit Recent Change and Verify.
    R  - Change mode to RECENT CHANGE
    V  - Change mode to VERIFY
    <  - Go to CLASS MENU page.
    #  - If on CLASS MENU page Go to a VIEW MENU page #.
    #  - If on VIEW MENU page Go to a RECENT CHANGE or VERIFY
VIEW #.
    #.# - Go to a RECENT CHANGE or VERIFY VIEW. (CLASS#.VIEW#)

             ------------------------------------------------

                          SCREEN 2 OF 7  5ESS SWITCH
                            RECENT CHANGE VIEW H.1
                           COMMANDS FOR MENU PAGES

   #R  - Go to Recent Change view for read.
   #I  - Go to Recent Change view for insert.
   #D  - Go to Recent Change view for delete (only print Key
fields).
   #DV - Go to Recent Change view for delete with verify (print
all fields).
   #U  - Go to Recent Change view for update.
   #UI - Go to Recent Change view for update in insert mode (user
can change
         each field sequentially without typing field number).
   #V  - Go to Verify view.
   #N  - Go to next menu page. Back to the 1st page if there's no
next page.

               ------------------------------------------------

                          SCREEN 3 OF 7 5ESS SWITCH
                            RECENT CHANGE VIEW H.1
                              COMMANDS FOR BATCH

BMI - Delayed Activation Mode. Choose time or demand release (for
time
      release add service information). Select view number for
Recent Change.
BMD - Display Status of Delayed Activation Recent Changes.
BMR - Release a file of Recent Changes stored for Delayed
Activation.
IM  - Immediate Release Mode.

                    ____________________________________________

                          SCREEN 4 OF 7  5ESS SWITCH
                            RECENT CHANGE VIEW H.1
                              COMMANDS FOR VIEWS

     < - In first field: Leave this view and return to select
view number.
     < - Not in first field: Return to first field.
     ^ - In first field: Select new operation for this view.
     ^ - Not in first field: Return to previous field.
     > or ; - Go to end of view or stop at next required field.
     * - Execute the operation or go to next required field.
     ? - Toggle help messages on and off.
     Q - Abort this view and start over.
     V - Validate input for errors or warnings.

                    ____________________________________________

                          SCREEN 5 OF 7  5ESS SWITCH
                            RECENT CHANGE VIEW H.1
                              COMMANDS FOR VIEWS
```

R - Review view from Data Base.
I - Insert this view into Data Base.
U - Update this view into Data Base.
D - Delete this view from Data Base (only print Key fields).
C - CHANGE: Change a field - All fields may be changed except key fields
when in the update mode only.
C - CHANGE-INSERT: Allowed in the review mode only - Allows you to review
C - CHANGE-INSERT: Allowed in the review mode only - Allows you to review
a view and then insert a new view with similar field. You must change
the key fields to use this facility. You may change other fields as
required by the new view.
P - Print hard copy of screen image (must have RC/V printer attached).

SCREEN 6 OF 7 5ESS SWITCH
RECENT CHANGE VIEW H.1
COMMANDS FOR VIEWS

The following are used only on views containing LISTS.

` - Blank entire row.
- Sets this field to its default value.
: - Sets this row to its default value.
[- Go backward to previous row.
] - Go forward to next row.
; - Go to end of view or stop at next required field.
- Go to end of list and stop at next non-list field.
{ - Delete current row and move next row to current row.
} - Move current row to next row and allow insert of row.
= - Copy previous row to current row.
* - Execute the operation or stop at next required field.

SCREEN 7 OF 7 5ESS SWITCH
RECENT CHANGE VIEW H.1
COMMANDS FOR AUTOMATIC FORMS PRESENTATION

If RC/V is in automatic forms presentation and "Q" or "q" is
entered for the operation, the following commands are available.

A - Abort form fields. RC/V stays in the current form.
B - Bypass form. Go to next form using automatic forms presentation.
C - Cancel automatic forms presentation. The previous menu
will be displayed.
H - Display automatic forms presentation help messages.
< - Bypass form. Go to next form using automatic forms presentation.

When accessing the databases, here is a list of database access selections:

```
   I (insert) - Insert new data
   R (review) - Review existing data
   U (update) - Update or change existing data
   D (delete) - Delete (remove) unwanted data from the data base
   V (verify) - Verify the data in the data base.

These are to be entered when one sees the prompt:

------------------------------------------------------------------
------------

Enter Database Operation
I=Insert R=Review U=Update D=Delete : _

------------------------------------------------------------------
-------------
```

When using the RC/V menu system of the 5ESS, you may go and just keep going into sub-menus, and fall off the end of the Earth. Here are the navigational commands that are used to move around the menu system. As seen from the RC/V menu system help, you see "SCREEN X out of X." This means that there are so many screens to go and to move between the screens you use the `` < '' to move back (toward main menu) and `` > '' to move to the last menu. I know it is shown in the help menu, but it is not explained like it needs to be.

Batch Input

The Batch Input feature for the 5ESS switch allows recent changes (RC) to be entered at any date and time when the the RC update would be performed. This allows RC input to be entered quickly, and for a large number of inputs. The large numbers of RC input can be released quickly in batch mode. The RC input can then be entered at any time, stored until needed, and then released for use by the system whenever needed, at any specific date and/or time.

First and second level error correction is done during batch input.

There are several different modes of batch input. These are:

- BMI - batch mode input - TIMEREL and DEMAND
- BMD - batch mode display
- BMR - batch mode release

BMI - Batch Mode Input - TIMEREL and DEMAND

Entering BMI (Batch Mode Imput), one types `` BMI '' at the RC/V menu prompt. Once entering, you will be prompted with whether the input is DEMAND (demand) or TIMEREL (Time Release). DEMAND input allows one to manual have the batch update the database, TIMEREL is automatic. TIMEREL has one enter a time and date.

When using DEMAND, you will be prompted for the file name. The file will be in `` /rclog '' in the DMERT OS.

In TIMEREL, you will be prompted with the CLERK-ID, which in this case is the file name for the file in the `` /rclog ''. Then for VERBOSE options, the RC SRVOR (Recent Change Service Order) is displayed on the screen.

-RC SRVOR View in the BMI TIMEREL Batch Option-

```
------------------------------------------------------------------
-------------

                              5ESS SWITCH
                           RECENT CHANGE  B.1
                        SERVICE ORDER NUMBER VIEW

     *1. ORDNO     __________
     *2. ITNO      ____
     *3. MSGNO     ____

     #4. RDATE     ______
     #5. RTIME     ____

Enter Insert, Change, Validate, or Print:

------------------------------------------------------------------
------------

ORDNO = Service Order Number
ITNO  = Item Number
MSGNO = Message Number
RDATE = Release Date (Update database Date)
RTIME = Release Time (Update database Time)

BMD - batch mode display

   BMD is a "mask" of RC/V done from the RC/V channel craft
shell, by using the
REPT:RCHIST or a pseudo menu system. All transactions are
displayed on the ROP,
though the data could also be sent to a file in the `` /rclog ''
in DMERT.
   The Pseudo menu system looks like:

------------------------------------------------------------------
-----------

1. Summary of clerk activity

2. Activity by service order number

3. Activity by clerk ID

4. Return to view or class menu.

------------------------------------------------------------------
-----------

1  allows one to view the "DELAYED RELEASE SUMMARY REPORT."
2  produces a "DELAYED RELEASE REPORT BY SERVICE ORDER."
3  produces the "DELAYED RELEASE REPORT BY CLERK ID."
4  Return to view or class menu, self-explanatory.

REPT:RCHIST - BMD

  The REPT:RCHIST BMD (Text) command is done from the RC/V
channel craft
shell. The command synopsis is:

5E2 - 5E5 (Generics)

REPT:RCHIST,CLERK=[,FORMAT={SUMMARY|DETAIL}]{[,ALL]|[,PENDING][,C
OMPLETE]
[,ERROR][,DEMAND]}[,DEST=FILENAME][,TIME=XXXXXXXXXX];

5E6 - 5E8 (Generics)

REPT:RCHIST,CLERK=a[,FORMAT={SUMMARY|DETAIL}]
{,ALL|,b}[,DEST={c|FILE}]
```

[,TIME=XXXXXXXXXX];

SUMMARY - Report selection, format by key.
DETAIL - Report selection for Recent Change entire.
ALL - Report all recent changes.
PENDING - Report pending recent change input.
COMPLETE - Report released recent changes that was successful
when completed.
FILE - Name for file in /rclog
ERROR - Report recent changes released with error.
DEMAND - Report demand recent changes.
TIME=XXXXXXXXXX - XX - mounth, XX - day, XX - hour, XX minute, XX - Second

BMR - batch mode release

This is the manual release (updating) of the 5ESS database. This is done
from the RC/V channel craft shell. The command that is used is the EXC:RCRLS
input message. There is no real need to go into this message.

Adding RCF (Remote Call Forward) on a 5ESS
~~~~~~

1. At the "MENU COMMANDS" commands prompt of the 5ESS main menu in the
RC/V APPRC menu system of the 5ESS, enter '12' for the "BRCS FEATURE
DEFINITION". Then access screen '1.11', this is the BRCS screen. When it
asks you to 'ENTER DATABASE OPERATION' enter "U" for Update and hit
return.

B
NOTE: When at menu '12,' you will NOT see '1.11' listed in the menu
options. By just accessing menu '1' you will not be able to add features.
B
This is a problem with the 5ESS menu system.
B

2. Type in the Telephone Number. It should look like this:

B

Mon Feb 31 09:09:09 2001 RFA_TN

5ESS SWITCH WCDS0
SCREEN 1 OF 2 RECENT CHANGE 1.11
BRCS FEATURE ASSIGNMENT (LINE ASSIGNMENT)

*1. TN 5551212 * 2. OE _ _____ 3. LCC ___ 4. PIC 288
5. PTY _ 6. MLHG _____ 7. MEMB _____ 8. BFGN _____ _

FEATURE LIST (FEATLIST)

ROW	11. FEATURE	A	P	15. FEATURE	A	P	19. FEATURE	A	P	23. FEATURE	A	P
1.	/CFV	N	_	_____	_	_	_____	_	_			
~~~~~~

_____ _ _
  2.   _____ _ _   _____ _ _   _____ _ _
_____ _ _
  3.   _____ _ _   _____ _ _   _____ _ _
_____ _ _
  4.   _____ _ _   _____ _ _   _____ _ _
_____ _ _

B
B

---

   and will prompt you with:

Enter Insert, Change, Validate, screen#, or Print: _
form operation prompt

          I   -   to insert a form
          C   -   to change a field on a form
          V   -   to validate the form
          A   -   to display the desired screen number
          P   -   to print the current screen
          U   -   to update the form

   Enter `` C '' to change, access filed 11 and row 1 (goto the /CFV
   whereever it may be) or add /CFR if it is not there. If it does though,
   leave the "A" (Active) field "N" (Yes or No). Change the P (Presentation)
   column to "U" (Update). Then Hit Return.

   NOTE: Different Generics have other fields, one of them being a AC (Access
   Code) field. This field is a logical field, that mean only accepts a
   "Y" for yes and "N" for no. Also when adding the feature to the switch,
   the row and field numbers may not be shown, but will always follow this
   patern. Also note that the /CFV (Call forwarding varable) feature may not
   be there, there maybe no features on the line. These examples are from
   Generic 4 (2). Here is a example of 5E8 (which is not used too manu places,
   but this is what menu 1.11 in the BRCS Feature Definition looks like:

                              5ESS SWITCH
                        SCREEN 1 OF 2 RECENT CHANGE 1.11
                    (5112,5113)BRCS FEATURE ASSIGNMENT (LINE)

(*)1. TN _______ (*)2. OE _ _________   3. LCC ___   4. PID ___
(*)6. MLHG ____   8. BFGN _______ _
(*)5. PTY _(*)   7. MEMB ____

                         11. FEATURE LIST (FEATLIST)
 ROW FEATURE   A P AC R   ROW FEATURE   A P AC R   ROW

```
FEATURE   A P AC R
 1    ________  _ _ _  _     8   ________  _ _ _  _    15
________  _ _ _  _
 2    ________  _ _ _  _     9   ________  _ _ _  _    16
________  _ _ _  _
 3    ________  _ _ _  _    10   ________  _ _ _  _    17
________  _ _ _  _
 4    ________  _ _ _  _    11   ________  _ _ _  _    18
________  _ _ _  _
 5    ________  _ _ _  _    12   ________  _ _ _  _    19
________  _ _ _  _
 6    ________  _ _ _  _    13   ________  _ _ _  _    20
________  _ _ _  _
 7    ________  _ _ _  _    14   ________  _ _ _  _    21
________  _ _ _  _

Enter Insert, Change, Validate, screen#, or Print: _
```

Hit Return twice to get back to "ENTER UPDATE, CHANGE, SCREEN #, OR PRINT:".
Enter a "U" for update and hit Return. It will say "FORM UPDATE".

3. Next access screen 1.22, call forwarding (line parameters) or it will will
just come up automatically if you set the "P" to "U".

```
  Mon Feb 31 09:09:09 2001    RCFLNTN


                          5ESS SWITCH WCDS0
                        RECENT CHANGE 1.22
                 CALL FORWARDING (LINE PARAMETERS)

   *1. TN            5551212
   *6. FEATURE       CFR
    9. FWDTODN       ____________________________
   10. BILLAFTX      0                  16. SIMINTER       99
   11. TIMEOUT       0                  17. SIMINTRA       99
   12. BSTNINTVL     0                  18. CFMAX          32
   13. CPTNINTVL     0                  19. BSRING         N
```

---

4. If you used the automatic forms presentation, it will have the telephone
number already on LINE1. If not retype the telephone number you want
forwarded. The bottemof the screen will say "ENTER UPDATE, CHANGE, VALIDATE
OR PRINT:", type "C" for change and hit return.

5. When it says CHANGE FIELD type "9" and enter your forward to DN (Destination
Number) including NPA if nessary. This will put you back to the "CHANGE
FIELD" prompt. Hit return again for the "ENTER UPDAT, CHANGE, VALIDATE OR
PRINT:". Hit "U" for Update form and wait for "FORM UPDATED".

6. Lastly, access screen 1.12, BRCS FEATURE ACTIVATION (LINE ASSIGNMENT). At the
   prompt enter a "U" for Update, and on ROW 11 Line 1 (or whereever), change
   the "N" in column "A" to a "Y" for Yes, and you are done.

Adding other features
~~~~~~~~~~~~~~~~~~~~

  To add other features onto a line, follow the same format for adding the
/CFR, but you may not need to access 1.22. Some other features are:

Feature Code:		Feature Name:
/LIDLXA	-	CLID
/CFR	-	Remote Call Forward
/CWC1	-	Call Waiting
/CFBLIO	-	call forward busy line i/o
/CFDAIO	-	call forward don't answer i/o
/CFV	-	call forwarding variable
/CPUO	-	call pick up o !used in the selq1 field!
/CPUT	-	call pick up t !used in the tpredq field!
/CWC1D	-	Premiere call waiting
/DRIC	-	Dist. ring
/IDCT10	-	Inter room ID
/IDCTX2	-	1digit SC
/IDCTX2	-	Interoom ID 2
/IDCTX2	-	Premiere 7/30, conveniece dialing
/IDCTX3	-	Premiere 7/30, no cd
/IDMVP1	-	Premiere 2/6, no convenience dialing
/IDMVP2	-	Premiere 2/6, CD, not control sta.
/IDMVP3	-	Premiere 2/6, CD, control station
/MWCH1	-	Call hold
/MWCTIA2	-	Call transfer 2
/TGUUT	-	Terminal group ID number with TG view (1.29).

ANI/F the whole switch
~~~~~~~~~~~~~~~~~~~~~~

 Automatic Number Identification failure (also called "dark calls") are
caused by variety of different things. To understand this better, here are
the technical names and causes, note this is not in stone and the causes
are not the only causes for a ANI-F to occur.

ANF   -- Failure to receive automatic number identification
         (ANI) digits on incoming local access and transport
         area (LATA) trunk.
ANF2 -- Automatic number identification (ANI) collected by
         an operator following a failure to receive ANI
         digits on an incoming centralized automatic
         message accounting (CAMA) trunk from the DTMF decoder.
ANI   -- Time-out waiting for far off-hook from Traffic
         Service Position System (TSPS) before sending ANI
         digits.

  Though, I have always wondered how to set one up myself in a safe way.
 One way nice way to get ANI/F through a 5ESS to to use a inhibit command.

      INH:CAMAONI;

The command will inhibits centralized automatic message accounting (CAMA)

operator number identification (ONI) processing. This is done from the DTMF
decoder (going over later). This message will cause a minor alarm too occur.
If in the CO when the alarm occurs, you will here this bell all the time,
because something is always going out. In this case, this alarm is a level 1
(max to five) and the bell will ring once.
  Once this message is inputed, all calls through CAMA operator will be
free of change. So just dial the operator and you will have free calls.

To place this back on the switch, just type:

      ALW:CAMAONI;

and the minor alarm will stop, and things will go back to normal.

Setting up your own BLV on the 5ESS from the Craft shell RC/V Channel
~~~~~~
~~~

  Well, we have come to the fun part, how to access the No-Test trunk on
the 5ESS (this is also called adding the thrid trunk). I will not be too
specific on how to do this. You will need to figure out just how to do this.
  The first thing you want to do is to request a seizure of a line for
interactive trunk and line testing. One must assign a test position (TP).

SET:WSPHONE,TP=a,DN=b
SET:WSPOS,TP=a,DN=b

          a = A number between 1 and 8
          b = The number you wish assigned to the test position

  This will chose a number to be the test number on the switch. Now using
the CONN:WSLINE one can set up a BLV.

CONN:WSLINE,TP=a,DN=b;

          a = TP that you set from the SET:WSPOS
          b = The number you want to BLV

To set this up on a MLHG (can come in real useful for those peksy
                          public packet switched nerworks), do a:

CONN:WSLINE,TP=a,MLHG=x-y;

          x = MLHG number, y = MLHG member number

To take set things back to normal and disconnect the BLV do a:

DISC:WSPHONE,TP=z

          z = TP 1 through 8

NOTE:

One may need to do a ALW:CALLMON before entering the CONN commands

BIG NOTE:

If you set your home telephone number as the test position, and you
have only one phone line, you are stupid.

Comments about the Underground
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

   There are a few people out there who have no idea what they are doing, and
go on thinking they know it all (i.e. No Name Brand). It pisses me off when
when these people just go off and make shit up about things they have no idea
what they are talking about.
   This file is to all the lazy people out there that just keep bitching
and moaning about not knowning where to find information.

Other Sources
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Here is a list of Manuals that you can order from the CIC (1-800-432-6600).
Note that some of these manuals are well over hundreds of dollors.

Manual 234-105-110	System Maintenance Requirements and Tools
Manual 235-001-001	Documentation Guide
Manual 235-070-100	Switch Administration Guidelines
Manual 235-100-125	System Description
Manual 235-105-110	System Maintenance Requirements and Tools
Manual 235-105-200	Precutover and Cutover Procedures
Manual 235-105-210	Routine Operations and Maintenance
Manual 235-105-220	Corrective Maintenance
Manual 235-105-231	Hardware Change Procedures - Growth
Manual 235-105-24x	Generic Retrofit Procedures
Manual 235-105-250	System Recovery
Manual 235-105-250A	Craft Terminal Lockout Job Aid
Manual 235-105-331	Hardware Change Procedures - Degrowth
Manual 235-105-44x	Large Terminal Growth Procedures
Manual 235-118-200	Recent Change Procedures Menu Mode Generic Program
Manual 235-118-210	Recent Change Procedures Menu Mode
Manual 235-118-213	Menu Mode 5E4 Software Release
Manual 235-118-214	Batch Release 5E4 Software Release
Manual 235-118-215	Text Interface 5E4 Software Release
Manual 235-118-216	Recent Change Procedures
Manual 235-118-217	Recent Change Procedures Batch Release 5E5 Software Release
Manual 235-118-218	Recent Change Attribute Definitions 5E5 Software Release
Manual 235-118-21x	Recent Change Procedures - Menu Mode
Manual 235-118-224	Recent Change Procedures 5E6 Software Release
Manual 235-118-225	Recent Change Reference 5E6 Software Release
Manual 235-118-240	Recent Change Procedures
Manual 235-118-241	Recent Change Reference
Manual 235-118-242	Recent Change Procedures 5E8 Software Release
Manual 235-118-24x	Recent Change Procedures
Manual 235-118-311	Using RMAS 5E4 Software Release
Manual 235-118-400	Office Records and Database Query 5E4 Software Release
Manual 235-190-101	Business and Residence Modular Features **
Manual 235-190-105	ISDN Features and Applications
Manual 235-190-115	Local and Toll System Features
Manual 235-190-120	Common Channel Signaling Service Features

Manual 235-190-130 Local Area Services Features
Manual 235-190-300 Billing Features
Manual 235-600-103 Translations Data
Manual 235-600-30x ECD/SG Data Base
Manual 235-600-400 Audits
Manual 235-600-500 Assert Manual
Manual 235-600-601 Processor Recovery Messages
Manual 235-700-300 Peripheral Diagnostic Language
Manual 235-900-101 Technical Specification and System Description
Manual 235-900-103 Technical Specification
Manual 235-900-104 Product Specification
Manual 235-900-10x Product Specification
Manual 235-900-301 ISDN Basic Rate Interface Specification
Manual 250-505-100 OSPS Description and Procedures
Manual 363-200-101 DCLU Integrated SLC Carrier System
Manual TG-5 Translation Guide

Practice 254-341-100 File System Software Subsystem Description 3B20D Computer
Practice 254-301-110 Input-Output Processor Peripheral Controllers
Description and Theory of Operation AT$T 3B20D
Model 1 Computer None.
Practice 254-341-220 3B20 System Diagnostic Software Subsystem Description 3B20D Processor

CIC Select Code 303-001 Craft Interface User's Guide
CIC Select Code 303-002 Diagnostics User's Guide
CIC Select Code 303-006 AT$T AM UNIX RTR Operating System, System Audits Guide

IM-5D000-01 Input Manual
OM-5d000-01 Output Manual

OPA-5P670-01 The Administrator User Guide
OPA-5P672-01 The Operator User Guide
OPA-5P674-01 The RMAS Generic - Provided User Masks

Trademarks
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5ESS - Registered trademark of AT&T.
CLCI - Trademark of Bell Communications Research, Inc.
CLLI - Trademark of Bell Communixation Research, Inc.
ESS - Trademark of AT&T.
SLC - Registered trademark of AT&T.
UNIX - Registered trademark of AT&T.
DMERT - Registered trademark of AT&T.
SCCS - Registered trademark of AT&T
DMS - Registered trademark of Northern Telecom
DEC - Registered trademark of Digital Equipment Corporation.
VT100 - Trademark of Digital Equipment Corporation.

Acronyms and Abbreviations
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ADTS - Automatic Data Test System
ALIT - Automatic Line Insulation Testing
AMA - Automatic Message Accounting
AP - Attached Processor (1AESS 3B20)
ATICS - Automated Toll Integrity Checking System
BLV - Busy Line Verification
BMD - Batch Mode Display
BMI - Batch Mode Input - TIMEREL and DEMAND
BMR - Batch Mode Release
BRCS - Business Residence Custom Service
CAMA - Centralized Automatic Message Accounting
CIC - Customer Information Center (AT$T)

DAMT - Direct Access Mechanize Testing
DLTU - Digital Line Trunk Unit
DMERT - Duplex Multiple Environment Real Time
DSU - Digital Service Unit
DTAC - Digital Test Access Connector
GRASP - Generic Access Package
IOP - Input/Output Processor
IPS - Integrated Provisioning System
ISDN - Integrated Services Digital Network
ITNO - Item Number
LMOS - Loop Maintenance Operations System
LU - Line Unit
MCC - Master Control Center
MLT-2 - Mechanized Loop Testing - The Second Generation of Equipment
MML - Man Machine Language
MSGNO - Message Number
MSGS - Message Switch
NCT - Network Control and Timing
ODD - Office Dependent Data
OE - Office Equipment
ONI - Operator Number Identification
ORDNO - Service Order Number
OSPS - Operator Service Po